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CASE REPORT

Looping of a central venous catheter during pediatric cardiac surgery

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Summary Although several complications with central venous catheters have been discussed extensively, intravascular migration is uncommon and often goes unrecognized during surgery. We present a case of central venous catheter looping into the left innominate vein after cardiopulmonary bypass during pediatric cardiac surgery. The clinical signs of a lack of backflow from the central venous catheter and different catheter tip positions on transesophageal echocardiography should alert clinicians to the possibility of intravascular migration.

1. Introduction

Central venous catheter (CVC) placement is an essential monitoring procedure during pediatric cardiac surgery. It is often used to provide hemodynamic information and drug delivery to the central circulation. Although several complications of CVC have been discussed extensively, intravascular migration is uncommon and often goes unrecognized during surgery. We present a case of CVC looping into the left innominate vein after cardiopulmonary bypass (CPB) during pediatric cardiac surgery, and describe the warning signs that must alert clinicians.

2. Case report

A 10-year-old girl, 28 kg in weight and 142 cm in height, was scheduled for surgical excision of a left atrial mass

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diagnosed by transthoracic echocardiography. Her physical examination was unremarkable. A written preoperative consent for anesthesia including CVC and transesophageal echocardiography (TEE) placement was obtained. After induction of general anesthesia and endotracheal intubation, a 5.5F triple-lumen central venous catheter (Arrow International, Inc, Reading, PA, USA) was inserted via the right internal jugular vein using the Seldinger technique. Cannulation of the vein was completed in one attempt, and the free flow of blood was confirmed by aspiration from all of the lumens. The monitor displayed a normal central venous pressure waveform. A pediatric TEE probe was placed easily into the esophagus, and a TEE examination was performed to confirm the presence of a large left atrial mass with a stalk attached to the inferior part of the interatrial septum. The midesophageal bicaval view was obtained to locate the catheter tip 1.0 cm below the superior vena cava-right atrial (SVC-RA) junction (Fig. 1). CPB was established through aortic and bicaval cannulation with both cavae encircled and snared. After the surgeon excised the left atrial mass by using the transseptal approach technique, weaning from the CPB was achieved by dopamine administration. A repeat TEE was performed and the catheter tip could not be visualized in the bicaval view. There was no aspiration of blood through the proximal lumen of the CVC, however, fluid and drug infusions were still feasible. Later, looping of the CVC into the distal portion of the left innominate vein was discovered via a chest radiograph in the intensive care unit (Fig. 2). The central line remained *in situ* for 4 days until dopamine therapy was discontinued. The patient had an uneventful recovery and left the hospital in 8 days.

3. Discussion

Central vein cannulation is standard practice during cardiac surgical procedures. Although intravascular migration of the central vein cannula, including catheter looping or knotting, has been described, it has mostly been observed during pulmonary artery catheterization or right-sided subclavian vein catheterization.[1–3] In pediatric cardiac surgery, insertion of a CVC via the internal jugular vein is often used instead of pulmonary artery catheterization. Therefore, CVC migration is an unusual intraoperative complication that conveys erroneous hemodynamic information and causes difficulty in the transfusion of drugs and fluid. The exact cause of this migration is uncertain. Previous research has suggested that a physical force acting on the catheter might displace the catheter backwards and upwards. Misra et al[4] reported a case of CVC looping caused by the SVC cannula pushing the CVC upward during cardiac surgery. In this case, we also hypothesize that the CPB with bicaval cannulation might have contributed to the complication. The SVC cannula passing through the right atrial appendage might have pushed the CVC upward, resulting in the looping of the catheter. In addition, the insertion length of the CVC was too great, and could have been a factor. Andropoulos et al[5] reported that TEE can be used to guide CVC positioning in pediatric cardiac surgery. The clinical signs of a lack of backflow from the CVC and different catheter tip positions on TEE should alert clinicians to the possibility of intravascular migration after CPB during pediatric cardiac surgery. However, the use of fluoroscopy is the most appropriate way to prove that the CVC is properly positioned when encountering signs of migration. It was fortunate that the CVC looping in this case did not cause any significant harm to the patient.

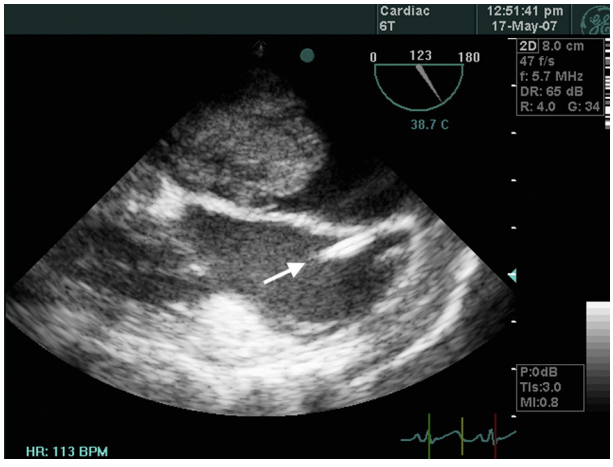

Figure 1 In the midesophageal bicaval view, the catheter tip (arrow) is visible 1.0 cm below the superior vena cava—right atrial junction.

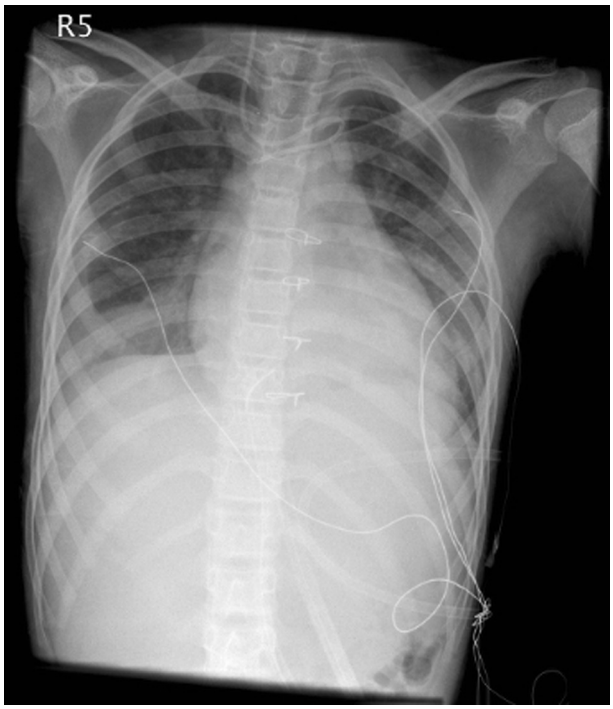

Figure 2 Chest radiograph showing looping of the central venous catheter into the distal portion of the left innominate vein.

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